PROTOCOL FOR ANALYSING PELLETS
REGURGITATED BY MEXICAN SPOTTED OWLS

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by

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Food habits of many raptors (including owls) are often described by enumerating prey remains found in regurgitated castings of bone and fur (pellets). Dietary indices (e.g. frequency of occurrence, relative frequency of items, and percent biomass consumed) are calculated from numerical counts of prey remains. Comparibility of diet studies can be impared if methods used to identify prey and talley results vary among researchers. Thus, standardized protocols for analysing prey remains must be established when conducting food habit comparisons among sampling units (e.g. individual birds, species, or study areas).   This paper describes a protocol used to analyze pellets of Mexican spotted owls. The purpose of this protocol is to standardized the procedures used to identify and talley remains found in the owls pellets. Development of this protocol was necessary to assure comparibility of dietary measures of the owl among different geographic regions (Ward and Block *in prep*.).

Contents of the protocol include (1) description procedures used to sort pellet contents, (2) tips for identifying appendicular skeletal parts, (3) description of pellet reamains form including definitions of codes and procedures for tallying remains, (4) examples of acronyms used in two owl diet studies, (5) key characteristics used to identify mammalian species from pellet remains, and (6) recommended literature.

METHODS USED FOR SORTING PELLETS

Bags containing pellet remains are sorted individually so that one analyzer is working on one bag at a time. The first step in sorting the pellets is to fill out the data sheet using the information from the collection slip. The number of pellets is determined at this time if it was not been supplied by the collector. All information on the collection slip is written on the Pellet/ Prey Remains Data Form. The bag I.D. # is written with an indelible ink pen on the original ziplock bag. A new bag is used if the old one is damaged or does not seal properly. The Bag I. D. # is also written on the data collection slip which is placed in the bag.

Dry pellets are teased apart using forceps and dissecting needles. All bones, insect parts, feathers and any other identifiers are sorted and saved. Only the fur, pine needles, grass, twigs and pieces of wood are discarded. After the pellet is sorted and identified on paper (See following pages for filling out the data form), all pieces are returned to the bag. All non-identified parts such as vertebrae, ribs ,toes, and skull fragments are placed in a smaller separate bag with the Bag I.D.# written on the outside of the bag. Insect and avian parts are always placed in smaller separate bags each with the Bag I.D. # and contents such as SMAV and INCT labelled on the outside. When there are many species represented in a pellet, the species are also sorted into individually labelled bags. Each of these bags are then placed in the original larger ziplock which was labelled prior to sorting.

IDENTIFYING APPENDICULAR SKELETAL PARTS

Appendicular skeletal parts are identified using a reference collection. Skeletal parts that can aid identification include forelimbs, hindlimbs and pelvic girdles. A reference collection is comprised of remains of known specimens, collected from the vicinity from which pellets were collected. Remains taken from pellets should not be used for reference materials because of the potential for circularity in the identification process. If reference specimens are not available from a specific study area, materials from a proximal museum should be consulted.

DESCRIPTION OF PELLET/PREY REMAINS FORM

The following codes and descriptions refer to the data form used to document the number of prey items found in dissected Mexican spotted owl pellets (Appendix A).

STANDARD INFORMATION:

SPECIES: Four letter code of the owl species that regurgitated the collected pellet.

SITE NAME: Full site name or number.

BAG ID #: Unique four letter/four number code for each bag of pellets. For example WWALK0193 refers to a bag of pellets collected at West Walker site, (WWALK) the bag # (01) and the year analyzed (93).

ANALYZED BY: Name(s) of person(s) analyzing the pellets.

SITE LOC: T: township R: range SEC: section

LANDOWNER:

COLLECTOR(S): Name(s) of person(s) collecting the pellets

DATE COLLECTED (MM/DD/YY): Month /Day /Year

NUMBER OF PELLETS: Number of pellets in bag to the nearest 0.5 pellet. If the number of pellets was not included on the collector's original data form then the number pellets is estimated by the pellet analyzer and their initials are placed in parentheses after the estimate.

PELLET CONDITION: Pellet condition is indicated at the time of collection. If the collector did not record this information leave this line blank. Codes used for pellet condition are IP = intact pellet, FP = fragmented pellet, LF = loose fragments, -M = moist, and -D = dry.

ADDITIONAL DATA IF KNOWN: The following categories are filled in if the information was supplied by the collector.

DATE REGURG. (MM/DD/YY): Date pellet regurgitated.

TIME REGURG. (ST MILITARY TIME): 24 hour clock, Standard time.

SEX OF INDIVIDUAL REGURG. PR (M, F, U): Sex of individual regurgitating prey. (Male, Female, Unknown)

AGE OF INDIVIDUAL REGURGITATING PR (A, S, F, U): Age of individual regurgitating prey. (Adult, Subadult, fledgling, unknown)

STATUS OF INDIV. OR PAIR CAPTURING PREY: Reproductive status of individual or pair capturing prey. Defined as the number of young fledged by the pair.

TYPE OF COLLECTION: EP = entire pellet, FP = pellet fragments, SP = stored prey, FS = food scrapes. If this information was not included by the collector then the analyzer estimates the type of collection.

BEGIN DEPOSITION (MM/DD/YY): Begin deposition period is the date when the collection was stored. (Not critical)

COMBINE WITH: The Bag I.D#(s) of any other bag(s) of pellets collected at the same site and on the same day.

COMMENTS: All of the collector's comments plus any other information on the pellet collection slip not included above is filled in here. If additional space is need then comments can be added to the back of the data sheet.

<u>LIST OF PREY REMAINS:</u>

PREY SPECIES: Four letter species genus code (Use the first two letter of the genus and
the first two letters of the species i.e. *Peromyscus maniculatus* = PEMA). See included
list of codes used for generic groups.

SKELETAL PART: The following skeletal parts are always listed when found. The skeletal
part that has the characteristic which determines the species identification is listed on the first
line across from the PREY SPECIES code.

Mammals

SKULL which consists of at least the premaxillaries,
       maxillary and palate
PALATINE which consists of the maxillary with the palate
MAXILLARY
PREMAXILLARY
MANDIBLE
HUMERUS   PELVIC GIRDLE (Ox Coxae)
ULNA   FEMUR
RADIUS   TIBIA
SCAPULA

Birds

MAXILLA   CARPOMETACARPUS
MANDIBLE   KEEL
CORACOID   FEMUR
HUMERUS   TIBIOTARSUS
ULNA   TARSOMETARSUS
RADIUS   SYNSACRUM

Insects

HEAD   ELYTRON
PROTHORAX   FEMUR

No. L: The number of left skeletal bones present in the above categories.

No. R. The number of right skeletal bones present in the above categories.

NOTE - The number of symmetrical skeletal bones is placed on the same line as the listed skeletal part. If the orientation of left or right could not be determined for fragmented bones the number of such bones is placed in parentheses next on the same line as the listed skeletal part. (See Example A). Please see the discussion on identifying appendicular skeletal parts below.

No. PRES: The minimum number of individuals present for the listed prey species. This count is determined by using the highest count of the skeletal part that determines species identification. For example if there were three right NEME maxilla and two left NEME maxilla then the number of NEME present would equal three. Skeletal parts are never used twice for two different Number Present counts.

When using Dalquest and Stangl's *Peromyscus* identification technique using lower jaws the minimum count is a little more complicated as illustrated below.

Species	Skeletal Part	No. L	No. R	No. PRES
PEMA	mandible	2	1	2
PEBO	mandible	1	1	1
PESP	mandible	0	1	0

It is assumed that the PESP right mandible could be the right mandible of the PEMA therefore no PESPs are counted if they can provide a match. The total of number present for a genus can not exceed the highest number of parts one side. Below is an example of when a PESP would be added to Number Present.

Species	Skeletal Part	No. L	No. R	No. PRES
PEMA	mandible	1	1	1
PEBO	mandible	1	0	1
PESP	mandible	2	1	2

The same principle is used to add the generic categories such as SMAM. If the number of one side of an appendage category, that can not be identified to genus or species, exceeds the combined total of the skull parts in that category, then a generic code count is tallied. For example:

Species	Skeletal Part	No. L	No. R	No. PRES
PEMA	mandible	1	1	1
PESP	mandible	1	1	1
	skull 2			
MISP	skull 1			1
	mandible	1	0	
SMAM	femur	3	4	1
	humerus	2	2	

Example A (Appendix A) is an actual pellet count and is included for reference.

LIST OF CODES USED IN 1994 PELLET ANALYSIS
FOR SACRAMENTO MTNS. AND BAR-M STUDIES

<u>MAMMALS</u>
Insectivora
SOME *Sorex merriami*
SOMO *S. monticolus*
SOSP *Sorex* species

Chiroptera
EPFU *Eptesicus fuscus*
LACI *Lasiurus cinerus*
ANPA *Antrozous pallidus*
?BAT Unknown bat

Lagomorpha
SYSP *Sylvilagus* species
LESP *Lepus* species

Rodentia
EUSP *Eutamias* species   (use for Bar-M sites)
TACA *Tamias canipes*
TAMI *T. minimus*
TAHU *Tamias husonicus (Tamiasciurus hudsonicus)*
TASP *Tamias* species
SPVA *Spermophilus variegatus*
SCFA Squirrel family

THBO *Thomomys bottae*

PRSP *Perognathus* species

REME *Reithrodontomys megalotis*

PEBO *Peromyscus boylii*
PEDI *P. difficilis*
PEMA *P. maniculatus*
PELU *P.leucopus*
PETR *P. truei*
PESP *Peromyscus* species

NEAL *Neotoma albigula*
NEME *N. mexicana*
NESP *Neotoma.* species

MILO *Microtus longicaudus*
MIME *M. mexicana*
MISP *Microtus* species

MUMU *Mus musculus*

SMAM Small mammals category includes *Peromyscus* spp, *Microtus* spp., *Mus musculus*
and other mammals the same approximate size. Insectivora and Chiroptera can be identified
by their appendages to family therefore are not added to this generic category for
identification counts.

MMAM Medium mammals category includes *Neotoma* spp., *Tamias* spp., *Thomomys* spp.,
and other mammals of the same approximate size.

LMAM Large Mammals are those viewed as large prey for a Spotted Owl such as *Lepus* or
Sylvilagus spp., and the larger squirrels such as *Spermophilus variegatus*.

UMAM Unknown mammals category is for any bones which can be determined to be
mammalian but not enough features exist to place in one of the above categories

BIRDS

SMAV small avian category includes hummingbirds, nuthatches, small wrens, kinglets,
gnatcatchers, and smaller warblers.

MDAV Medium avian category includes flycatchers, quail, woodpeckers (except flickers),
small owls, nightjars, swifts, swallows, titmice, chickadees, larger wrens, thrushes, vireos,
grosbeaks, sparrows, finches, towhees juncos and any other such sized birds.

LGAV Large avian are the jays, flickers doves, robins, kestrel, mockingbirds and all others
considered large prey for a Spotted Owl.

UNAV Unknown avian category is for those avian bones in which a size class can not be
determined.

REPTILES AND AMPHIBIANS

To date the only reptiles have been found in Great Horned Owl pellets on the Bar - M study.

ARTHROPODS

INCT Insects have not been classified to any other level to date.

DESCRIPTION OF CHARACTERISTICS USED TO IDENTIFY MAMMALIAN
SPECIES FOUND IN MEXICAN SPOTTED OWL PELLETS
(from the Sacramento Mtns. and Bar M. studies)

Insectivora

SOREX SPECIES
The following characteristics from Hoffmeister (p. 42-43) are used to distinguish the two
subgenus Sorex and Otisorex The characteristics used most often are listed first. The lower
jaw is usually present and if the skull survives the upper incisors frequently are intact.

subgenus Otisorex
Sorex monticolus
S. nanus

1. absence of a post mandibular foramen.
2. first upper incisors with well developed medial tines
3. third unicuspid smaller than fourth
4. pigment ridge on upper unicuspids extends from apices to cingulum.

subgenus Sorex
Sorex merriami
1. post mandibular foramen present
2. first upper incisors lacking well developed tines
3. third unicuspids as large or larger than fourth
4. pigment on upper unicuspids not extending to cingulum.

Notisorex crawfordii has three upper unicuspids and are pale orange or white rather than red.

Chiroptera
Dental formulas and drawings of cranial shape in Hoffmeister are used to determine bat
identity. Collections complied by SW Field Biologists for the Forest Service Region 3 are
also used.

Lagomorpha
Lagomorph bones are only identified to genus as most are highly fragmented and there is
overlap in size and range.

Rodentia

Sciuridae: are identified by dentition and by comparing measurements of any existing features to those given in the literature.

Geomyidae: The only *Thomomys* species historically found in the study areas is T. bottae. *Cratogeomys castanops* (also known as *Pappogeomys castanops*) is a larger pocket gopher and has a groove down the middle of the front of each upper incisor.

Heteromyidae: Only one *Perognathus* identified to date in a pellet not positively identified as coming from a Spotted owl by collectors. Hoffmeister used as a reference.

Muridae: Cricetinae
REITHRODONOMYS SPECIES: *Reithrodontomys* has a medial groove on each upper incisor.

Peromyscus
Characteristics used to identify *Peromyscus* species in the Sacramento Mtns are from the reference paper by Dalquest and Stangl (1983). Identification of seven species of *Peromyscus* from Trans-Pecos region of Texas by characteristics of the lower jaw. The following is the way the paper was interpreted used to identify *Peromyscus boylii*, *P. maniculatus*, and *P. difficilus*.

Glossary from Dalquest and Stangl (1983).

Incisor-base capsule, - the proximal end of the lower incisor in *Peromyscus* is enveloped in permanent enamel-forming organ and dental epithelium The organ lies at the level of the masseteric crest on the labial margin of the ramus. The bone swells slightly to greatly at this point to form a thin-walled, bony capsule containing the enamel forming organ.
Grade 0-only a slight labial bulge at the site of enamel-forming organ when the jaw is seen from directly above, with the coronoid process and labial side of the jaw held on the same plane.
Grade 1-capsule makes strong bulge.
Grade 2-capsule recessed on both dorsal and posterior margins, so that a blunt, finger like projection is formed.

<u>Anterocoid of the first lower molar</u>, -typically the anterocoid of m1 of *Peromyscus* bears a slight notch or groove on the anter-dorsal surface of unworn teeth.
Grade 0-notch absent or when present so shallow that it is worn away in early stages of attrition.
Grade 1-notch, though narrow, is persistent and moderately deep until late stages of wear.
Grade 2-distinct valley separating the anterocoid into inner and outer parts.

<u>Length of lower molar row</u>, -measurements taken on the lingual side, with the jaw slightly tilted, so that the margins of the alveoli were visible.

Priorities of characteristics used to distinguish species which are always checked with a 10x dissecting scope.

1. Grade of the incisor capsule.
2. Grade of anterocoid of the first lower molar.
3. Length of the lower molar row.

These three species are identified for the Sacramento Mtn study using the following information.

Species	Incisor capsule grade	Anterocoid grade	Molar length m1-m3 (mm)
PEMA	1 - 2	0	3.4 - 4.0
PEBO	0	0 - 1	3.6 - 4.2
PEDI	0	2	4.1 - 4.7

If m1 was not present and m1- m3 was greater than 4.2 mm the jaw was identified as a PEDI.
PELU (incisor capsule grade 2, anterocoid grade 0, m1-m3 = 3.5-4.1) have the same features as a PEMA. Therefore any PELUs are misidentified as PEMAs. *P. leucopus* has not been identified in the Sacramento Mtns trapping study.

The data for *P. truei* (incisor capsule grade 0, anterocoid grade 0-2, m1 -m3 = 3.8-4.2) from Dalquest only included 4 specimens and there is overlap features with *P. boylii* Therefore any PETRs would be identified as PEBOs. Few PETRs have been trapped in the Sac. Mtn . study.

Dalquest and Stangl also include data for *P. eremicus* and *P. pectroralis* but these species are not historically found in the Sacramento Mtns. analysis area.

All lower jaws have missing or broken incisor capsules are identified as *Peromyscus* species (PESP).

Neotoma

The distinguishing characteristic used to determine *Neotoma* species is the first upper molar
Neotoma mexicana has M1 with antero-medial (= anterointernal) fold deep, extending more
than half way across the crown. (Hoffmeister p. 424).
Neotoma albigula has antero-internal reentrant angle of M1 shallow.

Muridae: Microtinae

Microtus

In a few cases almost all of the skull is intact to measure the condylobasilar length but it is
usually absent. The incisive foramen is a characteristic that can be used with caution as there
seems to be some intermediate cases.

Microtus mexicanus's skull is short and broad, with the zygomatic breath usually greater than
60 per cent of the condlyobasilar length. Incisive foramina is broad (truncate) posteriorly
(Hoffmeister p. 441).

Microtus longicaudus has a zygomatic breath less than 60 per cent of the condylobasilar
length. Incisive foramina are tapered but not strongly constricted posteriorly (Hoffmeister p.
437)

Murinae

Mus

Mus musculus has the characteristic notch at the tip of the upper incisors when viewed from
the side and anterior face of incisors not grooved. The upper molars have three rows of
cusps.

LITERATURE USED IN PELLET ANALYSIS

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APPENDIX A.

Examples of data forms and character record forms used to enumerate and identify prey remains found in Mexican spotted owl pellets.

EXAMPLE A

PELLETS/PREY REMAINS DATA FORM

SPECIES __SPOW__

SITE NAME __W. WALKER   SAC. MTNS__

BAG I.D. # __WWAL 2293__ ANALYZED BY __S. DeROSIER__

SITE LOC: T_____   R_____   SEC_____

LANDOWNER _____

COLLECTOR(S) __WINSLOW__

DATE COLLECTED (MM/DD/YY) __04/28/93__ COL. _____

NUMBER OF PELLETS __2__

PELLET CONDITION __OLD PELLETS__

ADDITIONAL DATA IF KNOWN:

DATE REGURG.   (MM/DD/YY)   ___/___/___

TIME REGURG.   (PST MILITARY TIME)   ___:___

SEX OF INDIVIDUAL REGURG. PR (M,F,U,)   ___

AGE OF INDIVIDUAL REGURG PR (A,S,F,U)   ___

STATUS OF INDIV. OR PAIR CAPTURING PREY   _____

TYPE OF COLLECTION   __EP, FP__

(EP=entire pellet, FP=pellet fragments, SP=stored prey, FS= food scraps)

BEGIN DEPOSITION   (MM/DD/YY)   ___/___/___

COMBINE WITH   _____

COMMENTS   __FREQUENCY 172.360 / 172.340__

__♀ + ♂   OLD PELLETS__

LIST OF REMAINS

PREY SPECIES	SKELETAL PART	No. L	No. R	No. PRES
NEME	PALANTINE 1			①
	MANDIBLES		1	
MMAM (NEME)	HUMERUS	1		
	RADIUS (1)			
MILO	SKULL 1			①
MISP	MAXILLARY		1	①
	MANDIBLES	1	2	1
PEBO	MANDIBLE		1	①
PESP	MANDIBLE	2		①
	MAXILLARY	1	2	
	PREMAX	2	1	
SMAM	HUMERUS	4	3	
(MISP/PESP)	ULNA	4	4	

EXAMPLE A

PELLETS/PREY REMAINS DATA CONTINUATION FORM

SPECIES ___SPOW___

SITE NAME ___W·WALKER SAC MTNS___

BAG I.D. NUMBER ___WWAL 2293___

LIST OF REMAINS

PREY SPECIES	SKELETAL PART	No. L	No. R	No. PRES
SMAM (CONTINUED)	TIBIA	3	4	
	PELVIC GIRDLE	2	2	
	FEMUR	4	4	
INCT	FEMUR 1			①
	PLUS OTHER FRAGMENTS			

SPECIES NAME(S)	SKELETAL PART	CHARACTERISTIC
Neotoma mexicana N. albigula	M¹	antero-internal reentrant angle

N. albigula differs from *Neotoma mexicana* in hairs on the throat white to their bases rather than dusky, antero-internal reentrant angle of M¹ shallow rather than extending more than half way across the crown, premaxillaries extending farther posteriorly relative to end of nasals.
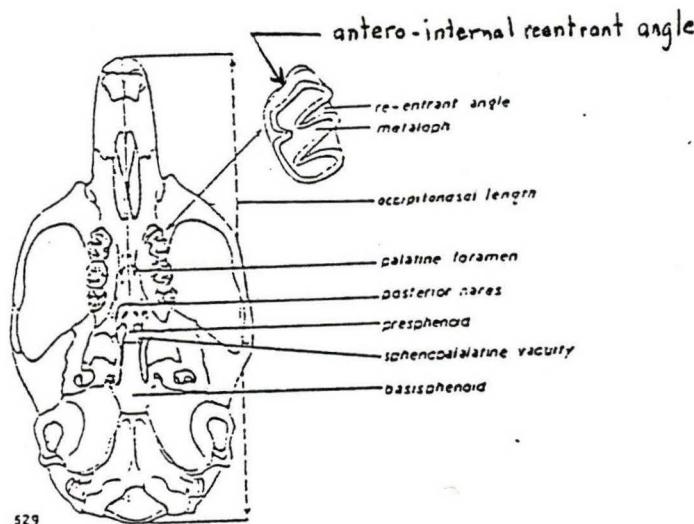

Fig. 629. Parts of the skull in ventral view of the Desert Wood Rat. *Neotoma lepida lepida*. Baker Creek, 7300 ft., White Pine Co., Nevada. No. 42031 M.V.Z., ♀, X 1½.
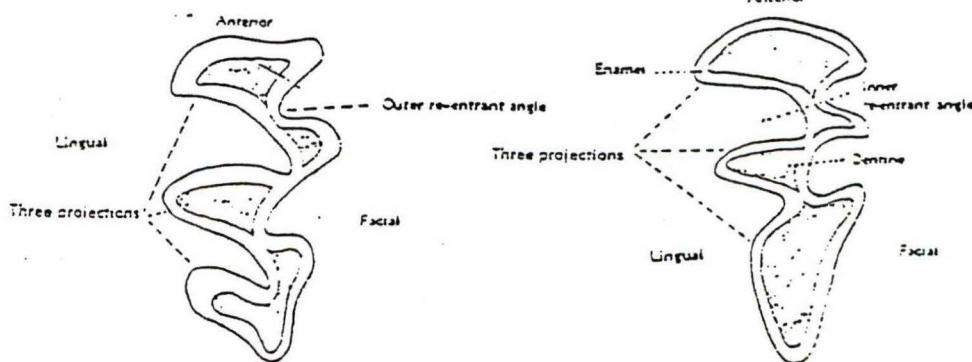

Fig. 46. Crown of the last upper molar (M³) of the heather vole (*Phenacomys intermedius*).

Fig. 47. Crown of last upper left molar (M³) of the sagebrush vole (*Lagurus curtatus*).

lbigula

Fig. 5.220. Left upper molar series of various *Neotoma*: N. albigula.

SPECIES NAME(S)   SKELETAL PART   CHARACTERISTIC

Comparisons. S. *merriami* differs from S. *monti-colus* in the presence of a post-mandibular foramen, rather than none; upper unicuspid 3 larger than uni-cuspid 4, rather than smaller; upper unicuspids with-out pigmented ridge from apices to cingula, rather than such a pigmented ridge. unless teeth are greatly worn; tines not present on medial side of first upper incisor, rather than present; rostrum broader; underparts usu-ally much lighter than upper parts, rather than only slightly lighter. Other comparisons are given under *Re-marks* and *Sorex*.

post-mandibular foramen present
SOME
SOAR

post mandibular foramen abse
SOMO
SONA
SOPA

five upper unicuspids
NOER

merriami   arizonae
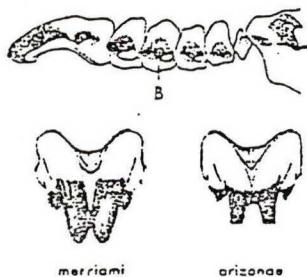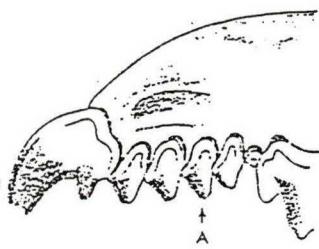
Sorex

Otisorex

Fig. 5.1. Trenchant characters for dis-tinguishing subgenus *Sorex* (*arizonae, merriami*) from subgenus *Otisorex* (*mon-ticolus, nanus, palustris*). Note the dif-ferences in (A) third unicuspid, (B) ex-tension of the pigmented area onto the cingulum, (C) medial tines on I¹ (and weak tines on *arizonae*), and (D) post-mandibular foramen.
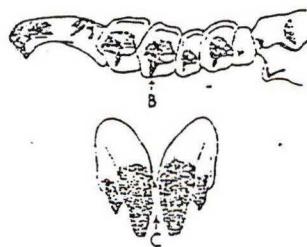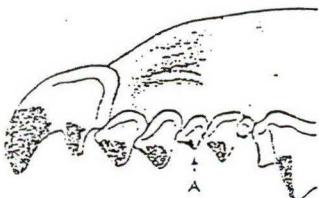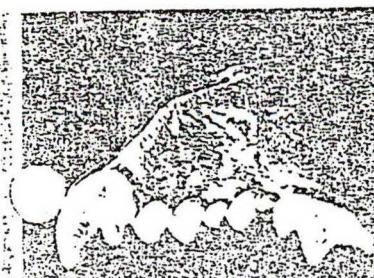
Fig. 5.2. Rostral portion of skulls of *Sorex monticolus* (upper), *Sorex merriami*

HOFFMEISTER P. 435 (fig 5.234) and p 441 (text)

SPECIES NAME(S)   SKELETAL PART   CHARACTERISTIC

M. *mexicanus* differs from *Microtus longicaudus* in
a much shorter tail, which is usually less than 29 per-
cent of the head and body length rather than 38 percent
or more, or is usually shorter than 34 mm rather than
longer than 43 mm; two pairs of mammary glands
rather than four; skull short and broad, with the zygo-
matic breadth usually greater than 60 percent of the
condylobasilar length rather than less; E-E′ / B-B′
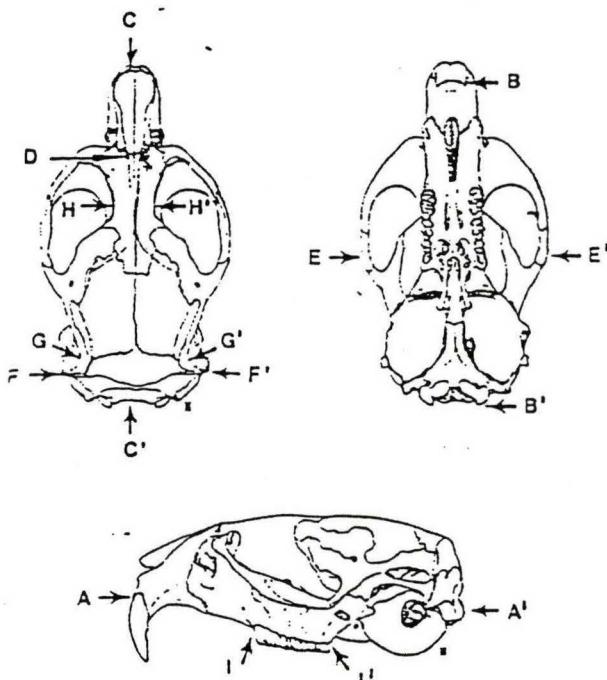
Fig. 5.234. Cranial measurements of microtines as shown on skull of
Microtus montanus. Cleveland Ranch, Nevada. A-A′, condylobasal
length; B-B′, condylobasilar length; C-C′, occipitonasal length; C-D,
nasal length; E-E′, zygomatic breadth; F-F′, lambdoidal or mastoidal
breadth; G-G′, prelambdoidal breadth; H-H′, interorbital breadth; I-I′,
alveolar toothrow.

PELLETS/PREY REMAINS DATA FORM

* SPECIES _____
* SITE NAME _____
* BAG I.D. # _____ * ANALYZED BY _____
SITE LOC: T_____ R_____ SEC_____
LANDOWNER _____
* COLLECTOR(S) _____
* DATE COLLECTED (MM/DD/YY) ___/___/___
* NUMBER OF PELLETS _____
PELLET CONDITION _____

ADDITIONAL DATA IF KNOWN:
DATE REGURG. (MM/DD/YY) ___/___/___
TIME REGURG. (PST MILITARY TIME) ____:____
SEX OF INDIVIDUAL REGURG. PR (M,F,U,) ____
AGE OF INDIVIDUAL REGURG PR (A,S,F,U) ____
STATUS OF INDIV. OR PAIR CAPTURING PREY _____

* TYPE OF COLLECTION ____
(EP=entire pellet, FP=pellet fragments, SP=stored prey, FS= food scraps)
BEGIN DEPOSITION (MM/DD/YY) ___/___/___
COMBINE WITH _____
* COMMENTS _____
_____

LIST OF REMAINS

* PREY SPECIES	* SKELETAL PART	* No. L	* No. R	* No. PRES

* INDICATES ITEMS THAT SHOULD ALWAYS BE FILLED OUT.

PELLETS/PREY REMAINS DATA CONTINUATION FORM

SPECIES _____

SITE NAME _____

BAG I.D. NUMBER _____

LIST OF REMAINS

PREY SPECIES	SKELETAL PART	No. L	No. R	No. PRES
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
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_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____
_____	_____	_____	_____	_____